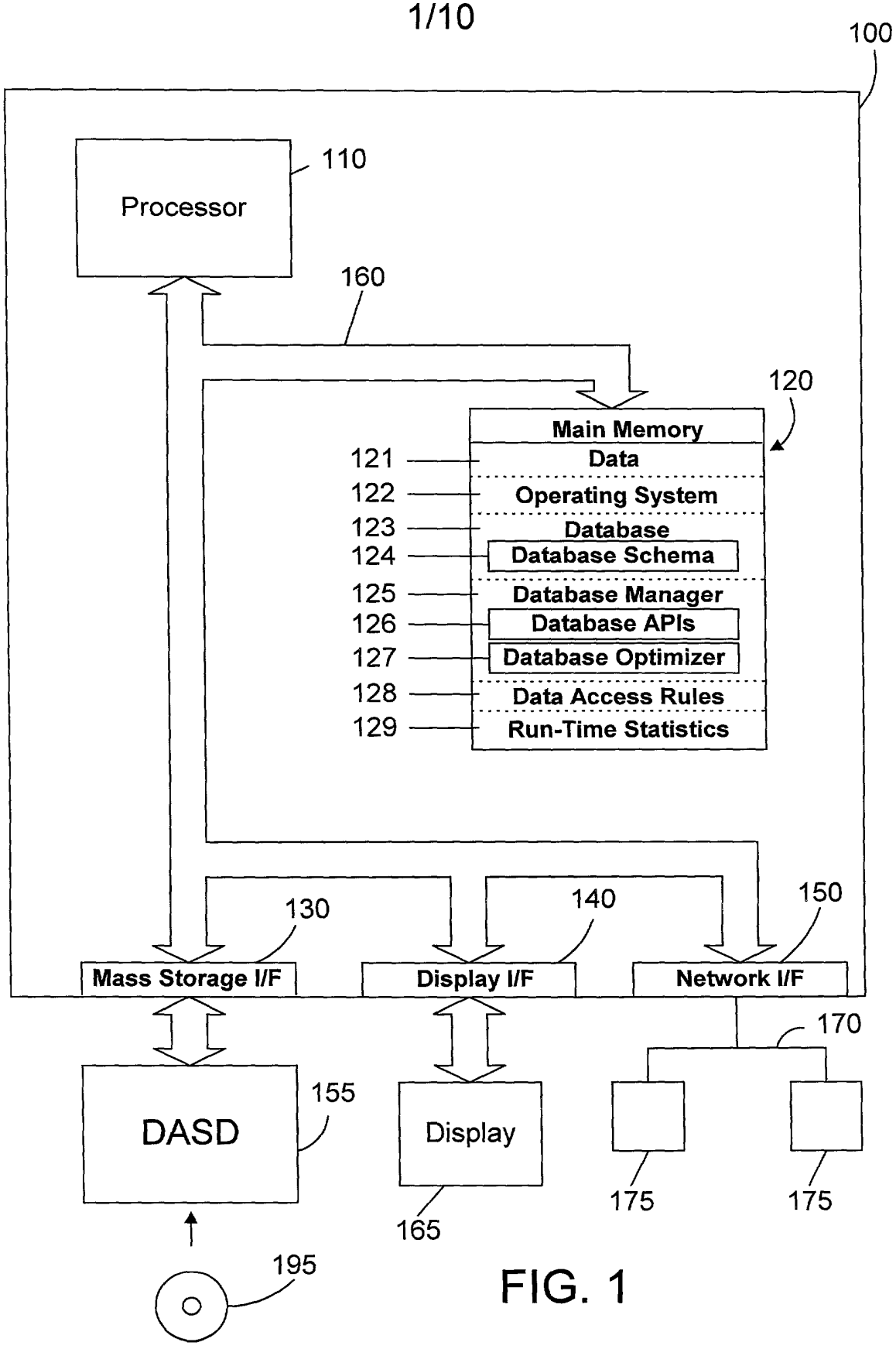

100
Processor
110
160
120
Main Memory
121
Data
122
Operating System
123
Database
124
Database Schema
125
Database Manager
126
Database APIs
127
Database Optimizer
128
Data Access Rules
129
Run-Time Statistics
130
140
150
Mass Storage I/F
Display I/F
Network I/F
170
DASD
155
Display
165
175
175
195

FIG. 1

```
Select * from Table1 where C1=4
AND (C2>6 OR C3!=8)
```

FIG. 2 Prior Art

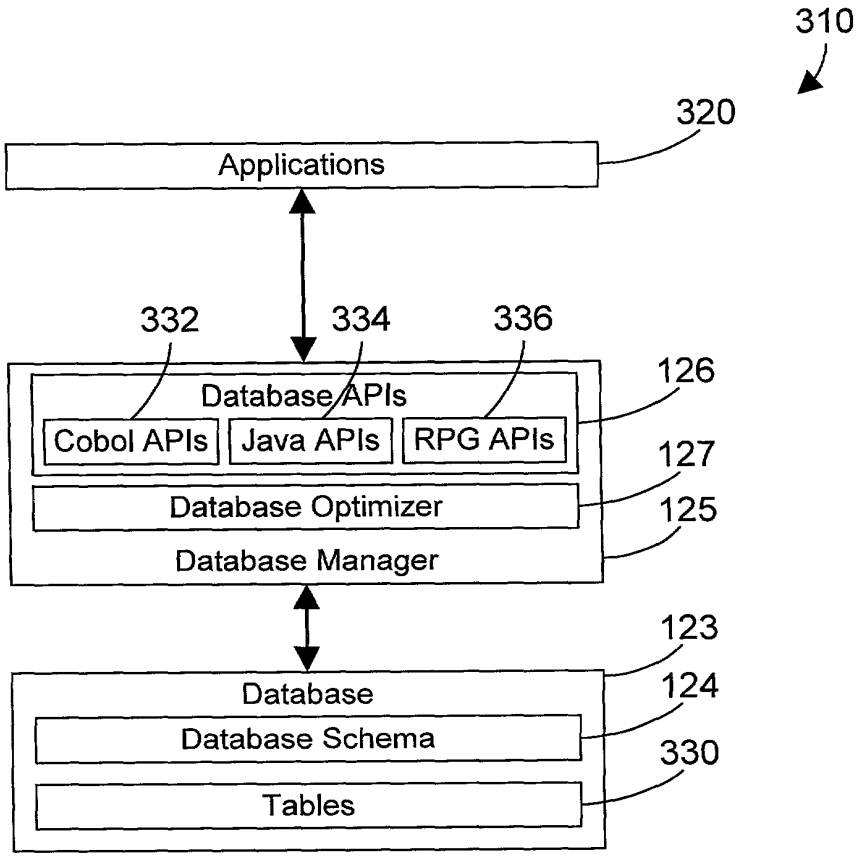


FIG. 3

ROC920010318US1

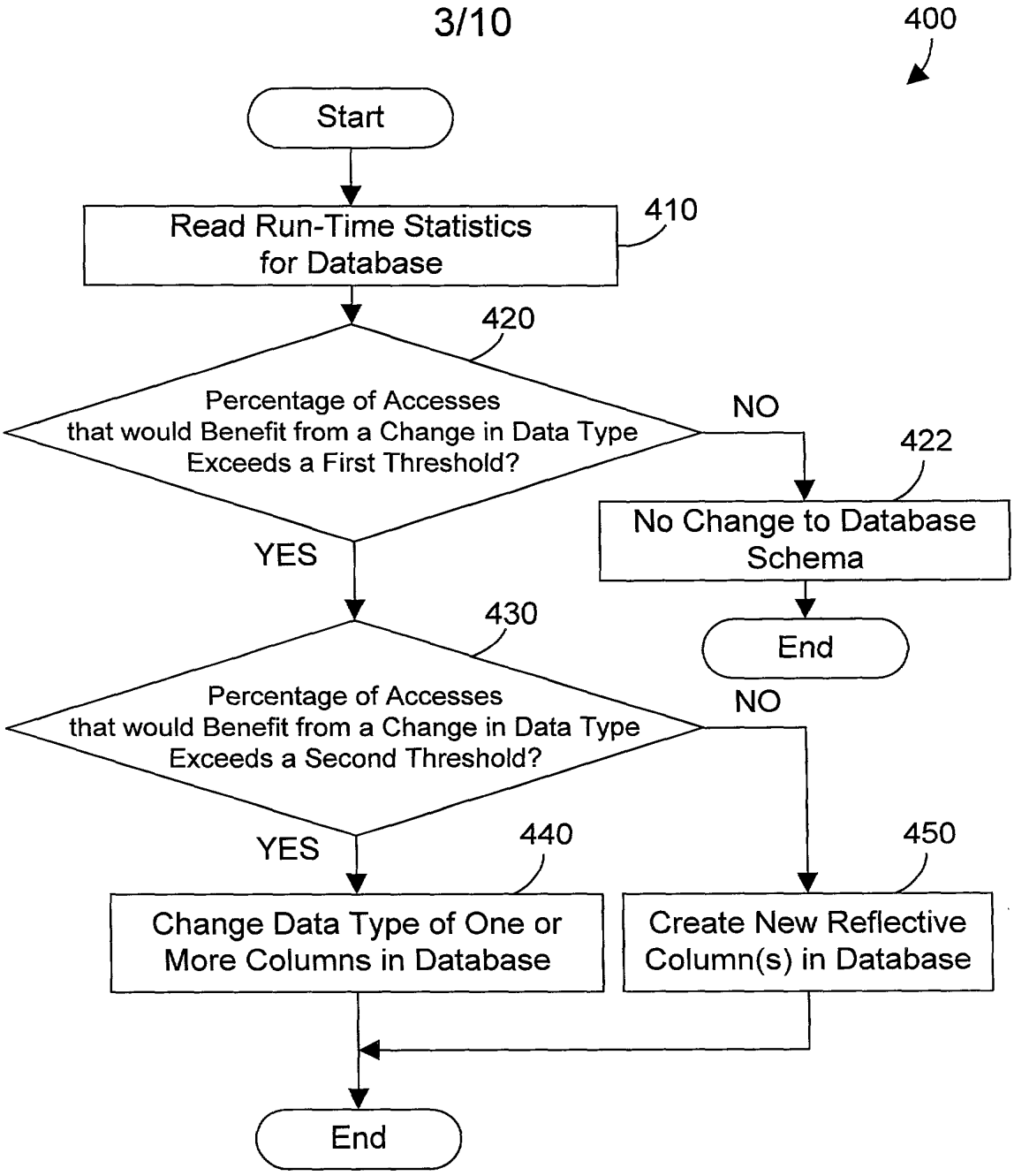

400
Start
Read Run-Time Statistics for Database
410
420
Percentage of Accesses that would Benefit from a Change in Data Type Exceeds a First Threshold?
NO
422
No Change to Database Schema
End
YES
430
Percentage of Accesses that would Benefit from a Change in Data Type Exceeds a Second Threshold?
NO
YES
440
450
Change Data Type of One or More Columns in Database
Create New Reflective Column(s) in Database
End

FIG. 4

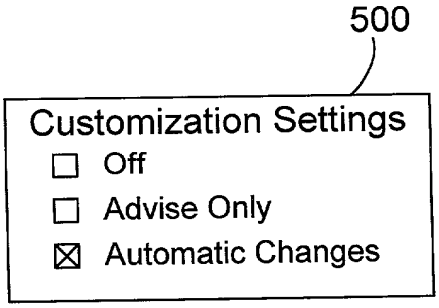


FIG. 5

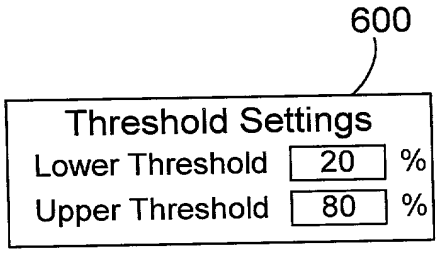


FIG. 6

700

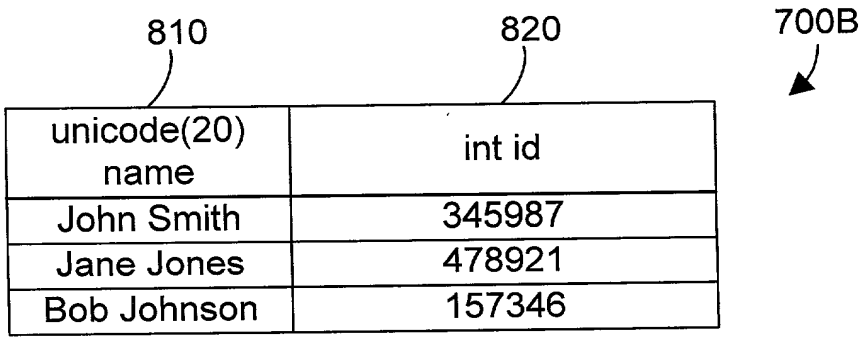
710 char(20) name	720 packed decimal (6,0) id
John Smith	345987
Jane Jones	478921
Bob Johnson	157346

FIG. 7

700A

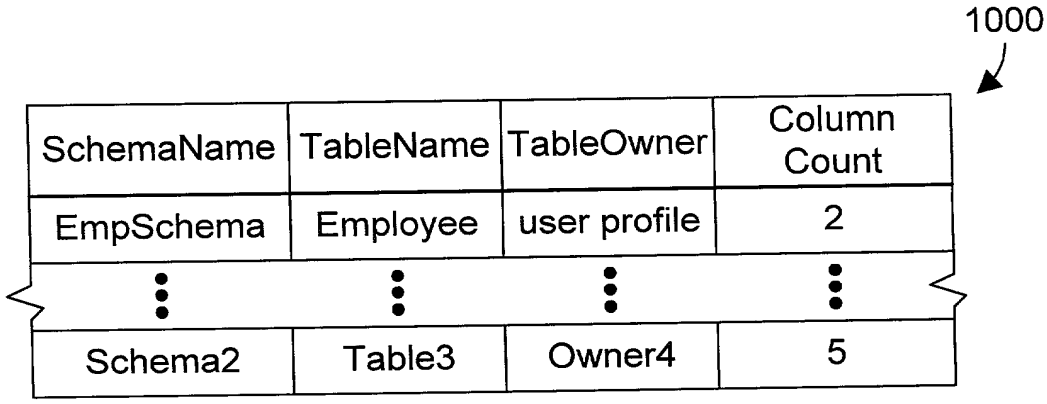
710 Char(20) name	720 packed decimal (6,0) id	810 unicode(20) name_ref	820 int id_ref
John Smith	345987	*	+
Jane Jones	478921	*	+
Bob Johnson	157346	*	+

FIG. 8



unicode(20) name	int id
John Smith	345987
Jane Jones	478921
Bob Johnson	157346

FIG. 9



SchemaName	TableName	TableOwner	Column Count
EmpSchema	Employee	user profile	2
⋮	⋮	⋮	⋮
Schema2	Table3	Owner4	5

FIG. 10 Prior Art

Column Name	Table Name	Schema Name	Data Type	Column Size
name	Employee	EmpSchema	char	20
id	Employee	EmpSchema	packed decimal	(6,0)

FIG. 11 Prior Art

1007565541.021402

1200

1210

SchemaName	TableName	TableOwner	Column Count	Contains Reflection
EmpSchema	Employee	user profile	2	False
⋮	⋮	⋮	⋮	⋮
Schema2	Table3	Owner4	5	False

FIG. 12

1300

1310 1320 1330

Column Name	Table Name	Schema Name	Data Type	Column Size	Is Reflective Column	Reflective for Column	Optimized for Paradigm
name	Employee	EmpSchema	char	20	False	Null	COBOL
id	Employee	EmpSchema	packed decimal	(6,0)	False	Null	COBOL

FIG. 13

1400

1210

SchemaName	TableName	TableOwner	Column Count	Contains Reflection
EmpSchema	Employee	user profile	2	True
⋮	⋮	⋮	⋮	⋮
Schema2	Table3	Owner4	5	False

FIG. 14

1500

1310 1320 1330

Column Name	Table Name	Schema Name	Data Type	Column Size	Is Reflective Column	Reflective for Column	Optimized for Paradigm
name	Employee	EmpSchema	char	20	True	name_ref	COBOL
id	Employee	EmpSchema	packed decimal	(6,0)	True	id_ref	COBOL
name_ref	Employee	EmpSchema	unicode	20	True	name	Java
id_ref	Employee	EmpSchema	int	6	True	id	Java

FIG. 15

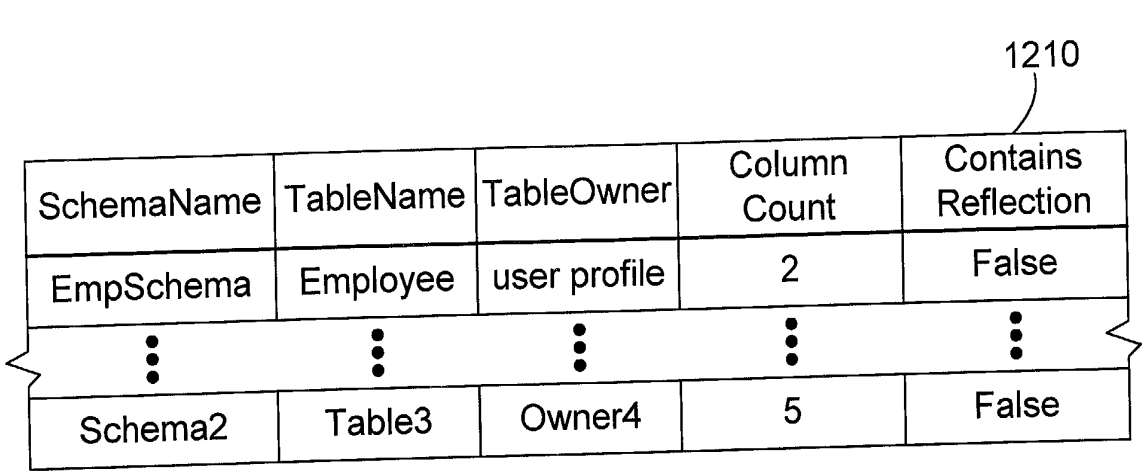


FIG. 16

1700

Column Name	Table Name	Schema Name	Data Type	Column Size	Is Reflective Column (1310)	Reflective for Column (1320)	Optimized for Paradigm (1330)
name	Employee	EmpSchema	unicode	20	False	Null	Java
id	Employee	EmpSchema	int	6	False	Null	Java

FIG. 17

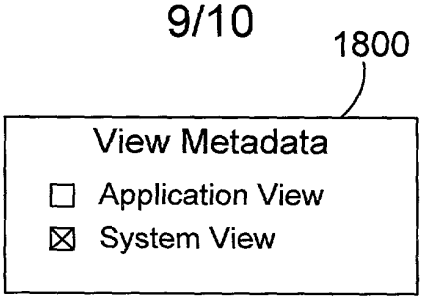


FIG. 18

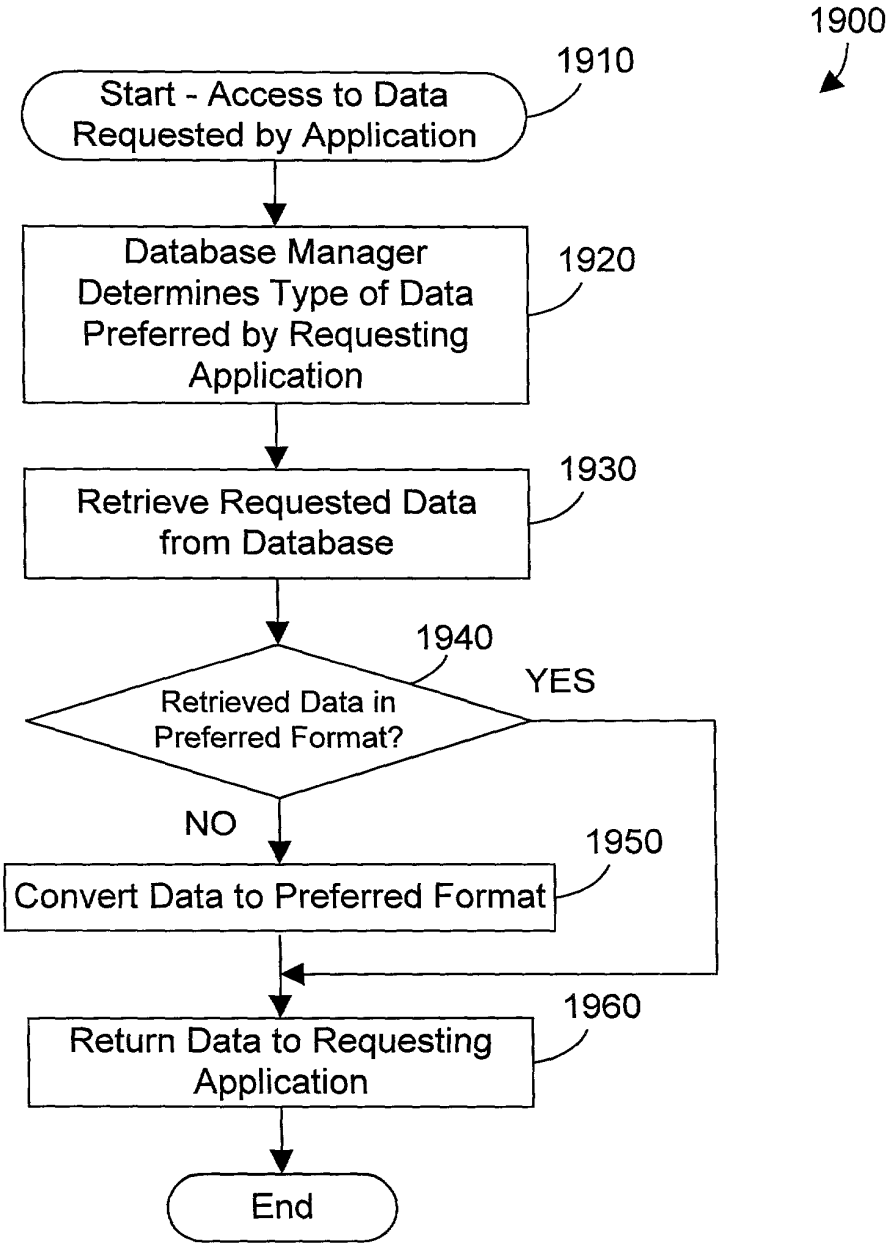


FIG. 19

ROC920010318US1.025402

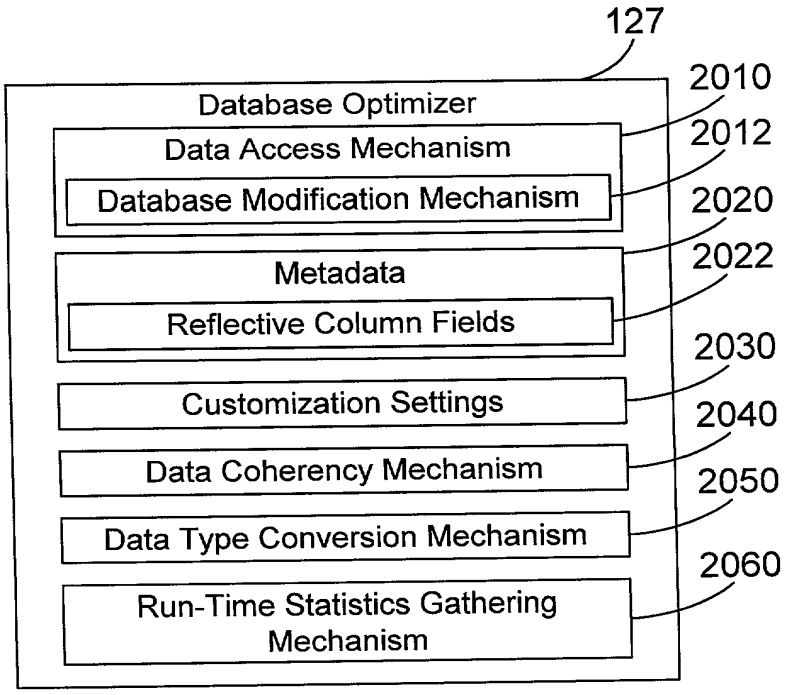


FIG. 20

US-PAT-NO: 6957425 B2